

Environmentalism and Christian Values in Hong Kong: The Potential Influences of Stewardship, Justice, Love, and Church Environmental Education

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Religious attributes affecting Christians' environmentalism have received considerable attention since the publication of Lynn White's thesis in 1967, which accused Christianity as the root cause of the ecological crisis. This study aims to assess the relationship between Christianity and environmentalism in Hong Kong, an Asian city where Christianity has been introduced for just more than two centuries. In general, Hong Kong Christians had a stronger willingness to sacrifice for the environment as compared to non-Christians. Both stewardship worldview and Christian justice and love were identified as the main drivers for environmentalism in Christians, which can be further improved via church environmental education. Our findings provide a particular example to broaden the diversity of the Christianity-environmentalism nexus and highlight the functional role of stewardship worldview in the Hong Kong context. However, we also call for stronger environmental education in Hong Kong's church to bridge the willingness-behavior gap among local Christians.

Keywords: environmental perception, willingness to sacrifice, environmental behavior, dominion, structural equation modeling.

INTRODUCTION

Environmentalism as Shaped by Christianity and Its Worldviews

In 1967, historian Lynn White argued that Christianity was the root cause of ecological crisis (White 1967). White argued that, in Christianity, man is made in God's image, and God planned

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everything on earth for man's benefit (White 1967). Biblical teachings granted humans a superior status and the right to "rule over" living creatures, and this interpretation has then shaped societal values, worldviews, and behaviors since Christianity prevailed (White 1967). Such claim has been supported by empirical evidence, mostly from the United States, where environmental concern is generally weaker in Christians than people of other religions or secularists (Clements, McCright, and Xiao 2014; Eckberg and Blocker 1989; Greeley 1993; Hand and Van Liere 1984; Hope and Jones 2014; Kanagy and Nelsen 1995; Konisky 2017). Various key religious attributes have been studied to explain this pattern, notably the interpretations of biblical teachings and worldviews, which can be broadly classified into dominion, God in nature, and stewardship worldviews (Dunlap and Van Liere 1984; Pepper and Leonard 2016; Tarakeshwar et al. 2001; Wolkomir et al. 1997; Woodrum and Hoban 1994). Christians with a dominion worldview believe that natural resources exist for exploitation by mankind and are, therefore, least concern for the environment (Dunlap and Van Liere 1984; Pepper and Leonard 2016; Wolkomir et al. 1997). Christians with a God in nature worldview, on the other hand, are more likely to concern for environmental issues. This worldview is similar to the sanctification of nature, where humans experience nature as a manifestation of God and, therefore, it is right to respect the environment (Tarakeshwar et al. 2001). God in nature worldview further shapes environmentalism in Christians by explicitly considering God's presence in nature (Pepper and Leonard 2016). Christians with a stewardship worldview hold the belief that humans are meant to be good stewards taking care of and protecting God's creation (Greeley 1993; Kearns 1996). However, studies by Nooney et al. (2003) and Djupe and Hunt (2009) found that worldview alone is unable to predict environmental behavior, suggesting a disjunction between abstract belief and actual behavior (Nooney et al. 2003). Deckman et al. (2023) suggested that the three worldviews are not necessarily incompatible with each other. In their study, almost half of the white evangelical Protestants agreed God called Christians to exercise dominion over all areas of society but, at the same time, over 80 percent of the same group considered living up to God's given role as stewards is extremely or very important. Half of those who expressed a dominion worldview also agreed that God would not allow humans to destroy the earth (Deckman et al. 2023).

Environmentalism as Shaped by Literalism, Eschatological Belief, and Religiosity

Some research argued that different worldviews and interpretations are associated with the extent of literalism, eschatological belief, and religiosity, which have also been theorized to influence Christians' environmentalism (Evans and Feng 2013; Fowler 1995; Guth et al. 1995; Hand and Van Liere 1984; Kanagy and Nelsen 1995; Sherkat and Ellison 2007). Literalists interpret the biblical text in a mechanical, grammatical, and logical way where, in extreme forms, literalists do not think the text should be interpreted metaphorically or in consideration of the unique situations addressed by the author (Elwell 2001). Compared to liberal churches, members of conservative Christian traditions are more likely to adopt a literalist position when interpreting the Bible (Bartkowski 1996; Ellison and Sherkat 1993; Elwell 2001) and, sometimes, they are linked to having a dominion worldview and lower environmental concerns (Eckberg and Blocker 1989; Greeley 1993; Hand and Van Liere 1984). In terms of eschatological belief (the doctrine of the end of history, resurrection of the dead, and the Messianic Era), Christians with a conservative eschatological belief argue that "End Times" will be inevitable and, therefore, there are no urgent needs to solve current environmental problems and participate in environmental actions (Guth et al. 1995; Zaleha and Szasz 2015). The imminence of "End Times" and the Second Coming of Jesus are core beliefs in dispensationalists, which discourage them from participating in environmental actions (Guth et al. 1995). Likewise, the belief in the afterlife among Christians has been suggested by Eckberg and Blocker (1989) and Hope and Jones (2014) to result in lower awareness of current social or environmental issues as compared to non-Christians. The literalist

and eschatological doctrines have been, therefore, theorized to be the drivers for lower environmentalism (Boyd 1999; Eckberg and Blocker 1989; Greeley 1993; Guth et al. 1995; Kanagy and Nelsen 1995). Religiosity, on the other hand, has equivocal impacts on Christians' environmentalism. Christians' environmental behavior and attitude have been shown to correlate positively and negatively, respectively, with religiosity (Clements, McCright, and Xiao 2014; Guth et al. 1995; Kanagy and Willits 1993), and in some cases, no relationships could be found between environmental measures and religiosity (Dietz and Guagnano 1998).

The Influence of Denominations

One potential factor leading to such variations in worldviews and interpretations among Christian members is the variety of denominations. Catholics have been shown to be more supportive of environmental protection than Protestants (Greeley 1993; Guth et al. 1995) and, among Protestants, the environmental concern of fundamentalists is relatively weaker than other members (Boyd 1999; Kanagy and Nelsen 1995). Conservative and fundamentalist beliefs have been shown to negatively correlate with environmental concern (Boyd 1999; Eckberg and Blocker 1989; Kanagy and Nelsen 1995), which is likely attributable to their stronger dominion worldview as compared to other denominations (Hand and Van Liere 1984). Evangelicalism has also been traditionally considered to express weak environmental concerns (Guth et al. 1995; Kanagy and Nelsen 1995). Conservative evangelicals are skeptical about the implications of climate change, and whether humans are responsible for such phenomenon (Barna Group 2018). Some evangelicals further express concerns that environmental management measures may adversely impact the poor, particularly in developing nations (Barna Group 2018). Nevertheless, some found that being an evangelical is not a predictor of negative environmentalism (Clements, McCright, and Xiao 2014; Woodrum and Hoban 1994), and Smith and Veldman (2020) found that evangelical affiliation has positive effects on environmentalism in Brazil. As such, while denomination may play a role in shaping Christians' environmentalism, empirical evidence rejects a simplistic view of this relationship and suggests a strong context-dependency in the influences of denomination.

Environmentalism as a Way to Achieve "Justice and Love"

More recently, Christians' environmentalism has been suggested being shaped by their association of environmental issues with justice and love of Christianity (hereafter referred to as "justice and love," Fang et al. 2020; Kearns 1996), as well as proactive environmental education in church (Fang et al. 2020; Hitzhusen 2012). Due to the responsibility of stewards on God's creation, environmental protection has been interpreted to achieve justice by minimizing the impacts of environmental degradation on the poor and future generations (Fang et al. 2020; Kearns 1996). A similar belief holds from the "love" perspective due to one of the core biblical teachings "Love others as yourself," where maintaining a good environmental quality has become a key component to safeguard human welfare and people's living standards in contemporary societies. Deckman et al. (2023) showed that a vast majority of Christians in the United States find preventing humans from suffering and harm an important reason to protect the environment.

The importance of environmental protection and sustainability in safeguarding the environment (as an integration of creation), remediating human-induced environmental impacts, and achieving a just society have been increasingly recognized by Christian communities since the 1970s (World Council of Churches 2009). Environmental campaigns such as Evangelical Climate Initiative (Jewell and Payton n.d.), Shrinking the Footprint (Dioese of London n.d.), and LiveSimply (Catholic Agency for Overseas Development n.d.) had been established by various Christian communities worldwide to address both global and local environmental issues. By 2015, pressing environmental issues such as climate change have further been advocated as an integral part of the church teaching (Francis 2015). However, as argued above, the attitude of Christians toward

the natural environment remains complicated and divided. Some Christians are skeptical about the proenvironmental trend in the Christian community, considering such a trend to be associated with neo-pagan-style natural worship (Haluza-DeLay 2008; Zaleha and Szasz 2015), or hold the view that environmental concerns should be placed at a lower priority than social concerns such as working against poverty or homeless issues (Haluza-DeLay 2008). Although Webb and Hayhoe (2017) showed that environmentalism can be enhanced among Christians through education, the study of Carr et al. (2012) indicated that environmental issues receive less attention because they are not viewed as central to the mission of the church. Several studies have been conducted to examine whether there is a “greening” trend in Christians (Clements, McCright, and Xiao 2014; Konisky 2017), and their results showed that Christians are still less proenvironmental than non-Christians despite the proactive engagement of religious leaders and various Christian initiatives in environmental issues. Clements, McCright, and Xiao (2014) therefore concluded that the “greening” of Christianity does not occur among rank-and-file Christians. Consequently, although justice and love are universal, core Christian teachings, their implications on environmentalism are amenable to the priority of local churches, denominations, and environmental education in churches.

The Influence of Local Context

Such contextuality, or the paradigm of “contextual turn,” has recently challenged existing theories in linking environmentalism and religious doctrine (Fang et al. 2020; Smith and Veldman 2020). Indeed, cultural context can mediate the relationship between worldviews, biblical interpretations, and environmentalism. For example, studies in Brazil (Smith and Veldman 2020) and Taiwan (Fang et al. 2020) revealed weak relationships between religious affiliation and environmentalism, and religious doctrine may not have a universal effect on environmental attitudes (Smith and Veldman 2020). Brazilian Christians interpret the failure to steward the environment as itself a sin (Smith and Veldman 2020), in contrast to the United States where some Christians struggled to integrate sin and environmental degradation (Carr et al. 2012). Fang et al. (2020) concluded Taiwanese Christians’ environmental attitude is not influenced by their religious faith, but by the general friendly attitude toward the environment, which shapes Taiwanese’s worldview independently of the Christian faith. Research conducted by Hayes and Marangudakis (2000), which examined the impact of religion on environmental attitudes and behaviors across the United States, Canada, Great Britain, and New Zealand, also found inconsistent impacts of religion on Christians’ environmentalism across countries.

Environmentalism in Hong Kong Christians

Taken together, worldviews, interpretation of the Bible, eschatological belief, religiosity, justice and love, church education, denomination, as well as contextual differences, have the potential to influence Christians’ concern and behavior on environmental issues. In the case of Hong Kong, the first batch of missionaries arriving in the 19th century were Catholics and evangelicals (Catholic Diocese of Hong Kong n.d.; Lau 2018), and, since then, these two denominations have remained the largest groups in Hong Kong (Catholic Diocese of Hong Kong n.d.; Poon and Howlett 2020, see also Supporting Information). In Hong Kong, there has been less debate over environmental issues among Christians, who pay more attention to gospel preaching or ethical controversies in society (Lau 2018). Since the last decade, however, the local Christian community has started to organize seminars, conferences, and petitions to raise awareness of the natural environment and urban development (Creation Care Hong Kong 2019; Hong Kong Christian Council 2021; The Justice and Peace Commission 2021). A theological seminary in Hong Kong commenced ecotheology course in 2017 and launched several green measures in the seminary (Cho 2020). Whether Christians in Hong Kong show different Christianity-environmentalism patterns

from their Western counterparts, however, remains largely unexplored despite the Christian community contributes to more than 15 percent of the local population (Poon and Howlett 2020).

This study addresses this knowledge gap via two dimensions: (1) comparison between Christians and non-Christians in terms of environmental perception, willingness to sacrifice for the environment and environmental behavior in the Hong Kong context; and (2) establishing a structural model linking religious and environmental attributes among Hong Kong Christians. Such a structural model was set only for Christians to determine whether and how religious attributes can influence environmentalism directly (e.g., through different worldviews, Fang et al. 2020; Leary, Minton, and Mittelstaedt 2016; Pepper and Leonard 2016; Sherkat and Ellison 2007; Tarakeshwar et al. 2001) or indirectly (e.g., through the interrelationships between environmental attributes, Dunlap and Van Liere 1984; Fang et al. 2020; Octavia, Caninsti, and Arlinkasari 2021; Sherkat and Ellison 2007; Tarakeshwar et al. 2001). Both questionnaire and focus group approaches were adopted in this study to quantify the relationships between religious and environmental attributes among Hong Kong Christians and, from these results, potential strategies to enhance environmentalism among Hong Kong Christians were suggested.

MATERIALS AND METHODS

Questionnaire to Investigate the Relationships Between Religious and Environmental Attributes

Two sets of questionnaires were designed. One was designed to measure the religious attributes and environmentalism of Christians (Roman Catholics and Protestants) in Hong Kong, which was designed with reference to previous studies (Dunlap and Van Liere 1984; Fang et al. 2020; Pepper and Leonard 2016; Smith et al. 2019; Tarakeshwar et al. 2001; see Table 1) to enable comparisons between localities, with minor modification in wordings to facilitate interpretation by local Christians. Additional questions regarding the willingness to sacrifice for faith reasons, justice and love, as well as environmental education in church were also included as they are expected to affect Christians' environmentalism. Another set of questionnaire, which was a subset of the first one, was designed for non-Christians (which may include secularists, atheists and other non-Christian religions, see the Supporting Information) to measure the respondents' environmental but not religious attributes.

Three groups of questions were asked in the questionnaire for Christians: environmentalism (three question sets), religious attributes (five question sets), and demography (four questions), and two groups of questions were asked in the questionnaire for non-Christians: environmentalism (three question sets) and demography (four questions). For environmentalism, questions were asked to measure perception of environmental issues, willingness to sacrifice for environmental protection, and environmental behaviors in terms of lifestyle and action. These three components (perception, willingness, and behavior) have been commonly adopted to determine overall environmentalism of respondents (Clements, McCright, and Xiao 2014; Fang et al. 2020; Greeley 1993; Konisky 2017; Pepper and Leonard 2016; Tarakeshwar et al. 2001; Wolkomir et al. 1997; Woodrum and Hoban 1994). For religious attributes, questions on religiosity, worldview, literalism, eschatological belief, willingness to sacrifice for faith, justice and love, and environmental education in church were included. These metrics were measured to identify components in religious attributes that are expected or have been shown to influence environmentalism in Christians (see "Introduction"), and thus were irrelevant to and excluded in the questionnaires administered to non-Christians. For demography, however, information on gender, age, education, and income levels were included for both Christians and non-Christians, as environmentalism has been shown to vary with these variables (Consumer Council 2016; Dietz and Guagnano 1998; Kanagy, Humphrey, and Firebaugh 1994; Webb and Hayhoe 2017).

Table 1: Environmental and religious attributes measured by the questionnaire. Questions were designed following the respective references but with slight modification in wordings for local Christians (see the Supporting Information). Question sets 1 to 3 were designed for both Christians and non-Christians to examine their level of environmentalism, while question sets 4 to 9 were designed specifically for Christians to test the relationships between religious and environmental attributes. Question sets 5, 6, and 9 were not adopted from the literature but were designed specifically to measure the willingness to sacrifice for faith, views on justice and love, and environmental education in church

Question sets for both Christians and non-Christians:		
Question Set	Attribute	Reference(s)
1	Environmental perception	Pepper and Leonard (2016)
2	Willingness to sacrifice for the environment	Fang et al. (2020)
3	Environmental behavior	Pepper and Leonard (2016); Fang et al. (2020)

Questions sets for Christians only		
Question Set	Attribute	Reference(s)
4	Dominion, God in nature, and stewardship worldview	Tarakeshwar et al. (2001); Pepper and Leonard (2016)
5	Willingness to sacrifice for faith	/
6	Justice and love	/
7	Religiosity	Pepper and Leonard (2016); Smith et al. (2019); Fang et al. (2020)
8	Literalism and eschatological belief	Smith et al. (2019) (Literalism)
9	Environmental education in church	/

All questions were assessed using a five-point Likert scale (ranging from 1: strongly disagree or least frequently to 5: strongly agree or most frequently) except those about literalism, eschatological belief, and demographic background. For questions on literalism and eschatological belief, respondents' opinions were assessed based on the statements they selected indicating different levels of literalism/eschatological belief (ranging from 1: lowest degree of literalism/eschatological belief to 3: highest degree, see Supporting Information on the scorings of different statements). Questions with multiple items in the questionnaire were considered reliable as indicated by Cronbach's alpha reliability $> .7$ (see the Supporting Information for reliability analyses).

Sampling Scheme and Questionnaire Administration

Questionnaires were administered from February 1 to March 5, 2022. Only Hong Kong citizens aged 18 or above were recruited via a convenience sampling approach sending invitations to churches, friends, and relatives. Additional questionnaires were administered online due to COVID-19 pandemic concerns via snowball sampling on social media. Though such sampling was nonprobabilistic and thus prone to bias, efforts were made to reduce bias by active redistribution of the questionnaire to respondents from different demographic backgrounds. In total $N = 554$ effective responses were obtained for analyses (318 Christians and 236 non-Christians). Both sets

of questionnaires (for Christians and non-Christians) were distributed to all respondents where they could decide which questionnaire to answer according to their self-proclaimed religious identities (see the Supporting Information for both sets of questionnaires). Such a self-proclamation approach was adopted to differentiate Christians and non-Christians instead of active sampling since social clusters are often heterogeneous (e.g., people attending mass in churches might not be Christians) and religious belief is considered by some a form of sensitive personal data. As a result, active sampling schemes to stratify respondents to different religious identities were impractical and not adopted.

Focus Groups to Gather Self-Reflections on Church Environmental Education

Two focus groups were conducted to complement the quantitative information obtained from the questionnaire. In particular, the views and experiences on environmental education in church were discussed in detail to assess the prevalence of environmentalism among Hong Kong Christians, and to derive recommendations on strengthening environmental education and promoting environmentalism in church.

Purposive sampling was adopted to gather reflections from different stakeholders of the local Christian community on environmentalism. Participants were selected based on the following criteria: (1) Hong Kong citizen; (2) leaders in a church such as clergy or Sunday school teachers, or Christians who have experiences in conservation or environmental education in their churches or as their professions, or rank-and-file Christians whose churches have been engaging in environmental protection; and (3) selected participants should be balanced in age and gender as much as possible. In total, eight participants were invited with four participants for each focus group session (see the Supporting Information for background information of the invited participants). Each focus group session was conducted online due to the COVID-19 pandemic and lasted for 2 hours. Twelve predetermined questions (see the Supporting Information) were discussed and participants were allowed to engage in follow-up questions/open discussions. During the focus group sessions, the background of the research and preliminary results of the questionnaires were introduced to the participants, followed by discussions on their views on the questionnaire results, their experiences in promoting or participating in environmental protection activities in the church, and their opinions on the church's responsibility in engaging in environmental issues.

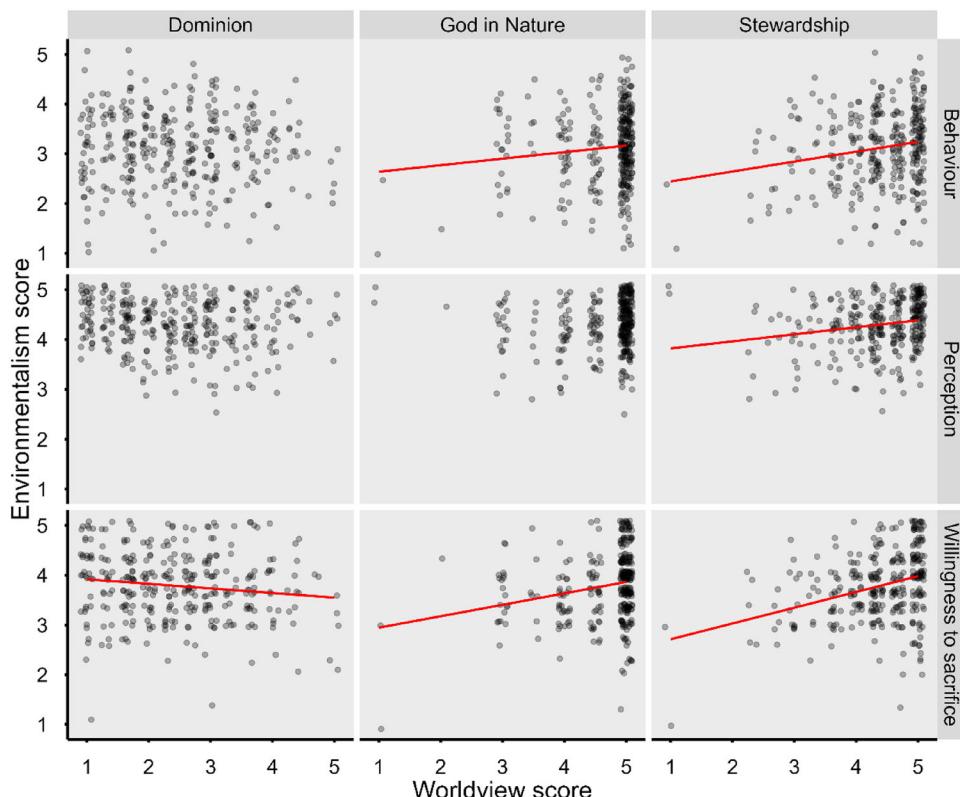
For both the questionnaire and focus groups, full consents were sought from the respondents/participants in accordance with the Research Ethics Compliance of The University of Hong Kong. Consents were also obtained from focus group participants in describing their background with alias and being video recorded for further analyses.

Statistical Analyses of the Questionnaire Results

For questions with multiple items in the questionnaire, scores of the items were first averaged to obtain a mean score for each of those questions. To compare environmentalism scores between Christians and non-Christians, multiple regressions were conducted to test if each component of environmentalism (perception, willingness, and behavior) differed between beliefs (Christians vs. non-Christians), gender, age, education, and income levels (excluding only one respondent with primary or below as the education level). Due to the dependency of age class on belief in terms of the willingness to sacrifice for the environment (Consumer Council 2016; Dietz and Guagnano 1998), the interaction between belief and age was also included as an explanatory variable. Backward selection was then performed to identify a smaller subset of explanatory variables to explain variations in environmentalism among the respondents. For Christian respondents, the same regression and model selection procedures were repeated with belief being replaced by environmental education in church to be one of the explanatory variables before model selection (and

Figure 1

Relationships between worldview (dominion, God in nature, stewardship; left to right) and environmentalism (behavior, perception, and willingness to sacrifice for the environment; top to bottom) scores among all respondents ($N = 554$). Significant linear regressions were shown in red lines. Data points were adjusted slightly (jittered by 0.1 in both the x and y directions) to facilitate visualization [Color figure can be viewed at wileyonlinelibrary.com]

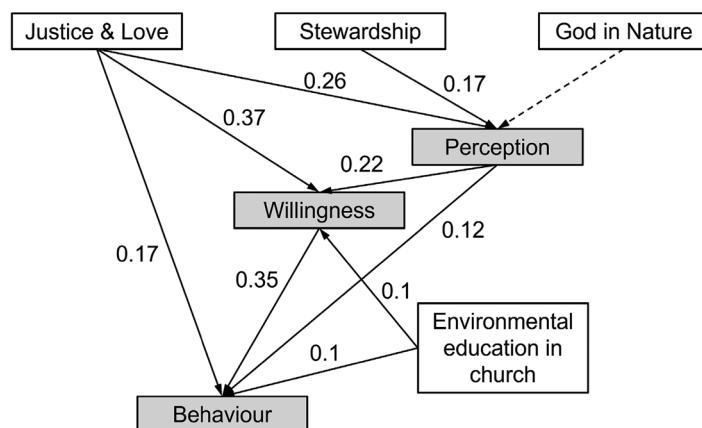


thus also excluding the interaction between belief and age). In terms of religious attributes, pairwise Spearman's correlation coefficients were calculated and tested against zero between scores of different worldviews (dominion, stewardship, and God in nature), religiosity, willingness to sacrifice for faith, literalism, eschatological belief, and justice and love.

To elucidate the underlying relationships between religious attributes and environmentalism, a structural equation model (SEM) was constructed following Clements, McCright, and Xiao (2014) and Fang et al. (2020) but with modifications to include a larger set of religious attributes and environmental education in church as model variables. Based on exploratory data analyses on the correlations between different religious and environmentalism attributes (e.g., between worldviews and environmentalism attributes, Figure 1), and also previous literature, which identified important paths between these attributes (e.g., God in nature and stewardship worldviews being associated with environmentalism, Fang et al. 2020; Leary, Minton, and Mittelstaedt 2016; Pepper and Leonard 2016; Sherkat and Ellison 2007; Tarakeshwar et al. 2001; relationships between environmental perception, willingness to sacrifice, and behavior, Dunlap and Van Liere 1984; Fang et al. 2020; Octavia, Caninsti, and Arlinkasari 2021; Sherkat and Ellison 2007; Tarakeshwar et al. 2001), an SEM with paths depicted in Figure 2 was formulated for local Christians to be tested against observed data using the package lavaan in R (Rosseel 2012). Specifically, environmental perception was expected to be influenced by stewardship, God in nature worldviews,

Figure 2

The structural equation model (SEM) proposed to explain the relationships between religious and environmental attributes of local Christians. All valid responses with different demographic backgrounds were used to construct the model ($N = 318$). Boxes indicate variables included in the SEM (white: religious attributes (justice and love, stewardship, and God in nature worldviews) and environmental education in church; gray: environmental attributes including environmental perception, willingness to sacrifice for the environment, and environmental behavior). Solid arrows indicate significant direct effects on dependent variables caused by independent variables, while the dotted arrow indicates direct effect that was not statistically significant. Numbers next to solid arrows are standardized coefficients indicating the strength of the relationships. All fitted standardized coefficients were positive



and justice and love, which may propagate to further influence willingness and behavior. Environmental education in church was also expected to influence these environmental attributes (see Table 2). Such an SEM path structure was first tested using all valid responses ($N = 318$), and then multigroup analyses were performed to investigate differences in SEM structures among respondents with different demographic backgrounds (genders, ages, education, and income levels). To achieve that, the same SEM structure was fitted to different demographic groups with or without the constraints that all the regression coefficients and intercepts remained the same between groups. Likelihood ratio tests were then conducted to compare models with or without such constraints to test for group differences in the SEM path strengths. Denomination was not included in the SEM as over 30 percent of the respondents selected “Others” in the questionnaires for their denomination, thus reducing the sample size substantially to investigate the denomination effects (see the Supporting Information).

RESULTS

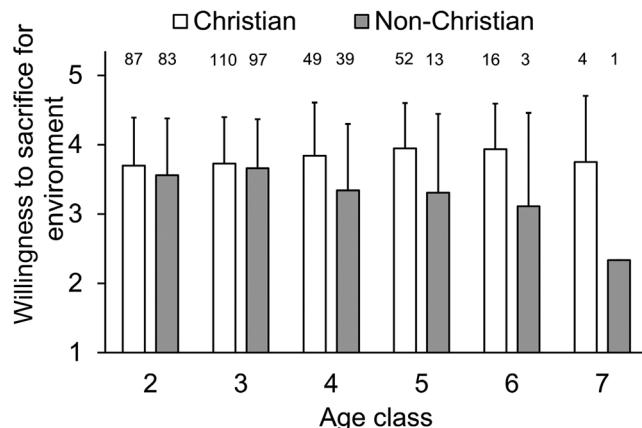
From the questionnaire, the willingness to sacrifice for the environment varied significantly among respondents with different beliefs, with non-Christians having lower willingness (3.54 ± 0.11 , mean \pm 95 percent CI) as compared to Christians (3.79 ± 0.08 , Table 2, Figure 3). Non-Christians also scored less in their environmental perception (4.22 ± 0.07) as compared to Christians (4.30 ± 0.06), though such a difference was not significant (Table 2). In terms of environmental behavior, although belief was not retained in the final model (scores = 3.12 ± 0.08 for Christians and 3.12 ± 0.10 for non-Christians), elder, female, and more educated respondents had higher scores (Table 2). Christians experiencing more environmental education

Table 2: Analyses of variances investigating factors influencing environmentalism (perception, willingness to sacrifice, and behavior) of Christians and non-Christians in Hong Kong. Factors were selected based on a backward selection procedure starting from a full model involving gender, age (coded from 2 to 7, see the Supporting Information for definitions), education, and income levels. In the case of comparing Christians and non-Christians, belief (Christians vs. non-Christians) and the interaction between belief and age were also included as potential explanatory variables prior to backward selection. In the case of Christian-only analyses, environmental education in church was added as a potential explanatory variable while belief and the interaction between belief and age were removed from the candidate variable list. The singleton observation with primary education was removed due to a lack of replication within the primary education group (leading to $N = 553$ for the analyses). Numbers are F -statistics with factor and residual degrees of freedom, and numbers in bold represent significant effect at $P < .05$. Effect sizes of the selected model are shown in terms of Cohen's f^2 (conventionally, $f^2 \leq .02$ indicates small effect, $f^2 \approx .15$ indicates medium effect, and $f^2 \geq .35$ indicates large effect). For significant factors with more than two levels, *post hoc* Tukey's tests were conducted, and results are shown in the lower panel of the table with increasing order of the mean responses among different levels or, in cases of significant differences, among statistically homogeneous subgroups

Source of Variations	Christians vs. Non-Christians			Christians Only		
	Perception	Willingness to Sacrifice	Behavior	Perception	Sacrifice	Behavior
Belief	$F_{1,550} = 3.41$	$F_{1,539} = 10.73$				
Gender	$F_{1,530} = 10.11$			$F_{1,544} = 6.83$		$F_{1,314} = 3.78$
Age				$F_{5,539} = 0.56$		$F_{5,308} = 3.38$
Education level				$F_{5,544} = 2.65$		$F_{2,308} = 2.40$
Belief \times Age				$F_{2,539} = 2.48$		
Church environmental education					$F_{1,314} = 2.21$	$F_{1,315} = 9.63$
Effect size (f^2)					$.06$	$.02$
<i>Post hoc</i> Tukey's tests to identify statistically homogeneous subgroups for significant factors with more than two levels (C = Christians and NC = non-Christians)					$.03$	$.10$
				Age		Age
				C: $2 = 3 = 4 = 6 = 5 = 7$	$2 \leq 3 = 4 = 7 \leq 5 = 6$	
				NC: $7 = 6 = 5 = 4 = 2 = 3$	Education level	
						$2 < 3 = 4$

Figure 3

Variations in the willingness to sacrifice for the environment among Christians (white bars) and non-Christians (gray bars) in Hong Kong. Age classes were coded as: 2 = 18 to 30 years old, 3 = 31 to 40 years old, 4 = 41 to 50 years old, 5 = 51 to 60 years old, 6 = 61 to 70 years old, and 7 = 71 years old or above. Values are displayed in mean \pm SD, and numbers above bars are the sample sizes in each group. All valid samples were included ($N = 554$)



in church scored more in both the willingness to sacrifice for the environment and environmental behavior (Table 2). In terms of religious attributes, there were strong, positive correlations between stewardship and God in nature worldviews, and also between stewardship worldview and the willingness to sacrifice for faith. All three worldviews were positively associated with religiosity, which also increased with the willingness to sacrifice for faith, literalism, and eschatological belief. Stewardship and God in nature worldviews showed positive correlations with justice and love, which were also positively correlated with the willingness to sacrifice for faith (Table 3).

The SEM proposed to explain the relationships between environmental and religious attributes showed a good fit to the observed data when all valid responses were included in the model (comparative fit index = .973; root mean square error of approximation (RMSEA) = .063, p of RMSEA $\leq .05 = .272$, $N = 318$), with positive paths linking religious and environmental attributes (Figure 2). In particular, strong effects of justice and love were identified on environmentalism of the respondents, with environmental education in church also contributing positively to the willingness to sacrifice for the environment and environmental behavior. Such a model did not differ between education levels (likelihood ratio test, $\chi^2_{26} = 25.77$, $p = .476$), but differed significantly between respondents with different genders, age classes, or income levels (see the Supporting Information for model coefficient comparisons). In general, the willingness to sacrifice for the environment and/or justice and love were often identified as strong drivers of environmental behaviors across respondents with different backgrounds in the SEMs (Figure 4). Justice and love or stewardship worldview were also frequently significant predictors for environmental perceptions. The impacts of environmental education in church on environmentalism varied between respondents with different backgrounds, however, with positive effects of environmental education on male, respondents aged 41 to 60 years, or with incomes of HKD 10,001 to 20,000 or HKD 40,001 or above per month (see the Supporting Information).

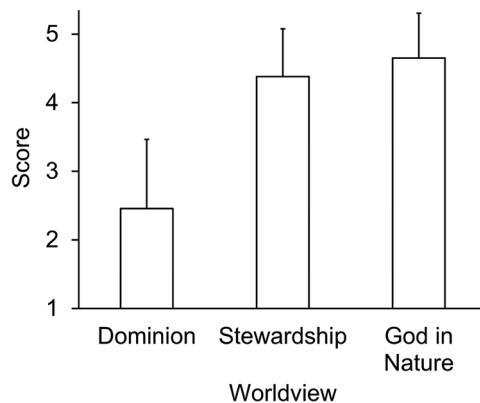
For the focus groups, the main consensus among participants was that environmental education was weak among churches in Hong Kong, as local churches often prioritize the spreading of the gospel and message of salvation over environmental issues. Participants 3 and 6 mentioned that the separation of religion and secularism in the past has discouraged local Christians from

Table 3: Spearman correlations between religious attributes (dominion, stewardship, God in nature worldviews, religiosity, willingness to sacrifice for faith, literalism, eschatological belief, and justice and love) among local Christians. Numbers are Spearman's correlation coefficients and bolded numbers represent significant correlations at $P < .05$. $N = 318$

	Dominion	Stewardship	God in Nature	Religiosity	Willingness to Sacrifice for Faith	Literalism	Eschatological Belief
Stewardship	.04						
God in nature	-.01	.60					
Religiosity	.12	.24	.23				
Willingness to sacrifice for faith	-.07	.47	.31	.23			
Literalism	.13	.10	.13	.17	.09		
Eschatological belief	.15	.06	.04	.28	.08		
Justice and love	-.10	.29	.13	.03	.63	-.05	
							-.02

Figure 4

Variations in the scores of different worldviews (dominion, stewardship, and God in nature) among Hong Kong Christians. These scores were computed by averaging the scores of multiple items measuring these worldviews in the questionnaire. Error bars are \pm SD and $N = 318$



engaging in social issues, and thus the lack of in-depth reflection on the relationship between humans and the earth. Participant 5 said ecological crisis emerged due to human sin, such as greed. Participant 6 further argued that the global ecological crisis today may not stem from Christianity itself, but the indifferent attitude of the church to address environmental issues as caused by human activities and disregard for social justice. Participants 5 and 8 shared that their environmental behaviors are not motivated by religious intentions, instead, they engaged in environmental behaviors and later associated those behaviors with religious teachings. Participant 2 added, that despite some churches have been involved in environmental protection activities, the churches seldom relate environmental behaviors to religious reasons or motivations.

Almost all participants, however, agreed that the church has an important role in environmental education for local Christians but, due to the lack of relevant background and theological training, church leaders had difficulties in implementing environmental education through the biblical teaching. There were mixed opinions among participants, however, on whether environmental education should be a priority for churches in Hong Kong. Participant 8 hesitated and questioned that given the wide variety of issues facing society today, should the church be responsible for every one of them. Participant 7 argued that, however, although the church could not solve all the problems about the society, at minimum the church should provide a platform for followers to discuss issues that they are concerned with.

One strategy to strengthen environmental education in the church, as Participant 7 mentioned, is to invite Christians with expertise in environmental education to deliver seminars or offer courses in this area. Experience from Participant 5, who was an environmental educator echoed this suggestion, sharing that the connection between religion and the environment had been successfully brought up in one of his church theology courses. This potential for environmental education in Hong Kong's Christian community was further demonstrated by Participant 1, who was a committee member in a local Catholic organization. He mentioned that discussion/dialog on environmental protection and social justice has been encouraged in his organization, which also held environmental activities regularly for Christians (e.g., field trips to localities proposed for future urban development and conservation film screening).

DISCUSSION

Christians Have a Higher Willingness to Sacrifice for the Environment as Compared to Non-Christians

Contrary to most previous studies in the United States showing environmentalism is less among Christians as compared to non-Christians (Clements, McCright, and Xiao 2014; Eckberg and Blocker 1989; Greeley 1993; Hand and Van Liere 1984; Hope and Jones 2014; Konisky 2017), Christians in Hong Kong had a higher willingness to sacrifice for the environment as compared to non-Christians. Such differences in the willingness could be driven by different environmental perceptions, which are, in turn, driven by religious attributes such as stewardship worldview or justice and love as identified in our study. The impacts of these religious attributes on Christians' environmentalism, however, could be influenced by the prevalent worldviews and biblical interpretations. One critical difference between Hong Kong Christians and Christians reported in previous studies, which were mostly conducted in the United States, is in their biblical interpretation. In the United States, a substantial portion of Christians are fundamentalists/literalists (Maclin 2009), around 36 percent and 30 percent of the population in 1988 and 2018 said they took every word in the Bible literally (Smith et al. 2019), but, in our study, only 15 percent of our respondents reported to interpret Bible literally. Literalists have been shown to have conservative political stance and skeptical attitude toward environmental threats (Coffman and Alexander 1992; Evans and Feng 2013; Guth et al. 1995; Hoffmann and Bartkowski 2008). On the other hand, the result is consistent with some studies outside the United States, which showed Christians had higher environmentalism levels than non-Christians (Fang et al. 2020; Smith and Veldman 2020). The result also reinforced Hayes and Marangudakis's (2000) conclusion that religious identification is a relatively weak and inconsistent predictor of environmental attitudes and behavior across nations (Hayes and Marangudakis 2000).

Environmental Perception and Behavior Did Not Significantly Differ Between Christians and Non-Christians

The similarities in both environmental perception and behavior between Christians and non-Christians in Hong Kong may be associated with regional demographic and ideological variations. Considering climate change as an illustrative environmental issue, a 2020 survey conducted in the United States revealed that only 55 percent of the 27,075 Americans interviewed were convinced that global warming is occurring and viewed it as an urgent or serious threat (Leiserowitz et al., 2021). Among those who were skeptical or dismissive about climate change, 70 percent were identified as politically conservative and demographically they tended to be non-Hispanic whites, older, and male (Leiserowitz et al. 2021). In contrast, a survey involving 1705 Hong Kong adults found that 92 percent are mostly or very convinced that climate change is impacting the planet (Liao et al. 2023). Another study in Hong Kong highlighted that 71 percent of the respondents consider rising temperatures and extreme weather events as their major concerns caused by climate change (Civic Exchange 2020). The overall societal divergence in environmental perception thus appears to be narrower in Hong Kong as compared to the United States. These findings align with our study, which observed similar environmental perception and behavior among respondents regardless of Christian belief. Beyond religious factors, regional differences may also contribute to this variation, including political ideology, education, and exposure to environmental degradation impacts. Further research will be needed to explore these contextual influences.

Hong Kong Christians Are Less Influenced by the Dominion Worldview as Compared to Christians in Western Countries

The dominion worldview has been proposed by White (1967) to be one of the core reasons driving lower environmentalism among Christians who, under the dominion worldview, believe that the natural environment exists to be exploited by mankind. This argument is supported by the observation that the willingness to sacrifice for the environment in Hong Kong Christians varied negatively their dominion worldview, although such relationship was weak (Figure 1). In fact, scores for the dominion worldview were generally lower as compared to God in nature or stewardship worldviews in Hong Kong Christians (Figure 4). This lack of dominion worldview echoed the weak literalist view among respondents, where only 15 percent of the respondents opted for the most literalist statement in the questionnaire. There was also a weak positive relationship between the dominion worldview and religiosity among Hong Kong Christians, which contrasted with the study by Pepper and Leonard (2016) arguing that religiosity is the driver for the dominion worldview.

Why does the dominion worldview not prevail among Hong Kong Christians? One potential reason might be due to differences between the Chinese and English translations of the Bible. King James Version (KJV) and New International Version (NIV) are two popular Bible versions among Christians in the United States (Goff, Farnsley, and Thuesen 2014). In Genesis 1:28 of KJV, the original Hebrew scripture was translated as “And God blessed them, and God said unto them, be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth.” In NIV, it was translated as “God blessed them and said to them, ‘Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish in the sea and the birds in the sky and over every living creature that moves on the ground.’” Both versions entail a strong sense of ruling over the natural environment by mankind. In the Hong Kong Christian community, however, two common Bible versions used by Protestants are the Chinese Union Version (CUV) and Revised Chinese Union Version (RCUV), in which the words “subdue” and “dominion over/rule over” were translated as “治理” and “管理,” respectively. The Studium Biblicum Version used by Chinese Catholics also translated the word as “治理.” Both Chinese terms bear the meaning of “to manage” instead of “to subdue” or “to rule over” and, as a result, the Genesis chapter in the CUV/RCUV version tends to be interpreted as having stewardship instead of a dominion worldview (Theology of Work n.d.). This translation difference might explain why the mean score of the dominion worldview was lower than the stewardship worldview among Hong Kong Christians, and why the dominion worldview was only weakly correlated with religiosity. Indeed, the higher mean scores in God in nature and stewardship worldviews, as well as the stronger correlations between these worldviews and religiosity as compared to the dominion worldview, further corroborate that Christians in Hong Kong tend to perceive the human-nature association in the Bible as a stewardship instead of a dominion relationship, contrary to anthropocentrism as suggested by White (1967). Such stewardship worldview is, therefore, a potential primary distinguishing factor between Christians in Hong Kong and the United States, which is important in driving environmental perception among Hong Kong Christians.

The effects of such differences in translation remain questionable, however, due to the low literalism among Hong Kong Christians. One reason for the low biblical literalism in our survey might be due to the high education attainment of the respondents. Over 85 percent of our respondents attained tertiary education in their education levels (see Supporting Information). This is consistent with the results of Stroope (2011), who found that churches dominated by Christians with a college degree were less engaged with a literalist view of the Bible. Sherkat (2011) also suggested a negative correlation between literalism and science literacy. As such, whether the “docile” Chinese translation of “rule over” in the Bible may influence local Christians’ interpretations, and ultimately their environmentalism, await further exploration.

Relationship Between Stewardship Worldview, Justice and Love, and Environmentalism

Our study shows positive relationships between stewardship worldview, justice and love, and environmentalism (Figures 1 and 2). However, the causation between religious attributes and environmentalism is difficult to establish without controlling for nonreligious beliefs and motivations. As in Vaidyanathan, Khalsa, and Ecklund's (2018) study, while respondents were able to articulate religious justifications for environmental actions, they contended that their environmental actions were not motivated by religion (Vaidyanathan, Khalsa, and Ecklund 2018). Participants 5 and 8 in our study expressed a similar thought that their environmental behavior was driven by their interest and concern for nature instead of religion. Religion might simply be a "*post hoc*" justification of their behavior, thus explaining the observation that Christians scored higher in willingness to sacrifice than non-Christians despite churches in Hong Kong in general rarely teach about topics on environmental issues. Religious attributes may reinforce environmentalism, however, by strengthening justifications for environmental concern and/or behavior (Carr et al. 2012; Fang et al. 2020; Hitzhusen 2012).

Bridging the Willingness-Behavior Gap of Hong Kong Christians

Hong Kong Christians exhibited a significantly greater willingness to make sacrifices for environmental protection than non-Christians. However, there were no statistical differences in their perception and behavior, indicating a willingness-behavior gap. Participant 7 recommended churches in Hong Kong should establish platforms for Christians to engage in discussions about environmental protection. Such a platform can arouse awareness among peers, provoke discussion and self-reflection, and potentially enable direct environmental behaviors to fill the willingness-behavior gap. For instance, Participant 1 highlighted how discussions on reclamation and social justice were initiated by organizing a field trip for Christians to visit localities proposed for reclamation and decipher the context in person. This aligns with existing theory, which emphasizes that religious congregations encourage introspection, confession of mistakes, and the practical application of ethical principles in daily life (Haluzza-DeLay 2008). Importantly, interactions within the Christian community may be more impactful than external educational activities due to the strong influence of social networks on behavioral change (Djupe and Hunt 2009). This is supported by Carr et al. (2012), who suggested that discussions initiated by pastors within local congregations serve as a potent means to raise awareness about environmental issues among the public.

Justice and Love as a Catalyst for Advancing Environmental Behavior

Previous studies have indicated that Hong Kong public generally recognize the severity of environmental issues in the city, but there is a reluctance to take actions to mitigate the impacts of these issues (Chiu, Hung, and Lai 1999; Lee 2003). Lee (2003) found that the public often feels powerless when addressing environmental issues. It is also suggested that, although traditional Chinese philosophy such as Confucianism and Taoism emphasize harmony with nature, such thinking when applied to modern Chinese societies may transform to a conformation with urban areas and built environments, thus broadening the society's tolerance to anthropogenic impacts on the environment (Boyden et al. 1981). As such, while Hong Kong public may have a high environmental perception and awareness, these attributes are seldom realized as actual behaviors.

What is the role of Christianity in motivating environmental behaviors? Christians exhibited a greater willingness to sacrifice than non-Christians in our study. Among Hong Kong Christians, justice and love exerted significant positive influence on environmental perception, willingness to sacrifice for the environment, and environmental behaviors. The core Christian value of "Love others as yourself" appears to bridge biblical teachings and environmental protection by fostering empathy toward those affected by environmental degradation. In our survey, respondents

with higher scores in justice and love also demonstrated a greater willingness to sacrifice for their faith. The correlation between justice, love, and environmentalism underscores the pivotal role of love and sacrifice as fundamental Christian teachings that promote environmental consciousness, proactive care, and a willingness to act for both the environment and humanity (Bakken, Engel, and Engel 1995). Additionally, justice and love may synergize with a stewardship worldview, enhancing environmental perception among Christians (Carr et al. 2012). Although environmental perception and behaviors were similar among Christians and non-Christians in Hong Kong, a stewardship worldview and the willingness to sacrifice for the environment are still potentially important drivers for environmental behaviors in local Christians. Ho (1995) investigated two Hong Kong secondary six students about their styles of environmental personalities. The conservationist student explained how his Christian beliefs motivate him to protect the earth, that although God declared that human beings should rule over this world, we should not destroy it as human are keepers of the world (Ho 1995). These findings further support the assertions of Hitzhusen (2012) and Haluza-Delay (2008) that there exist positive associations between stewardship, environmental education within churches, and environmentally responsible behavior.

Several focus group participants (Participants 5, 6, and 8) raised that environmental justice is alien to how most people in Hong Kong perceive justice (such as eradicating poverty and achieving equality). Concerns for social justice may, however, extend to the environmental dimension as society is inevitably impacted by a variety of environmental issues. This eco-justice perspective integrates Christian social justice with environmental concerns (Haluza-DeLay 2008; Kearns 1996), particularly on issues that affect people of color and the poor (Kearns 1996). For example, Gutierrez and LePrevost (2016) suggested that the southeastern region of the United States would be particularly susceptible to climate change impacts as this area is inhabited by communities of color and socioeconomically disadvantaged individuals. Establishing and promoting the linkage between environmental and social justice is, therefore, key to justifying stronger environmentalism in Christians and further developing environmental education in church.

Recommendation to Strengthen Environmental Education in Church

Indeed, environmental education in church has been identified as an additional driver for environmentalism among Hong Kong Christians other than religious attributes. This suggests that a possible approach to enhancing environmentalism among Christians is to strengthen environmental education in church, which has now only scored 2.6 out of 5 on average as rated by local Christians. Participants of the focus groups also held the view that such education was currently lacking in the Hong Kong Christian community. Currently, when church leaders in Hong Kong teach about the creation of God, rarely do they extend the theology to stewardship and the responsibility of humans in safeguarding nature. This is caused by a lack of relevant environmental background and theological training, as suggested during the focus group. Collaborations between clergies and scientists, however, are an effective means to enhance Christians' environmentalism (Harmannij 2019), and green groups have been collaborating with regional Christian communities to integrate religious teachings and pressing environmental issues (WWF-Guiana 2018; WWF-Malaysia 2022).

In recent years, such proactive engagement has been emerging among Hong Kong churches, where environmental education materials have been produced for Christians and also Catholic schools, and seminars have been organized to increase Christians' environmentalism (Creation Care Hong Kong 2019; Hong Kong Christian Council 2021; Justice and Peace Commission of the H.K. Catholic Diocese n.d.). Environment education in a religious context has been proven effective in an evangelical Christian college where students' proclimate beliefs are significantly increased after attending a lecture by a Christian climate scientist (Webb and Hayhoe 2017). This echoed the experience of one of our focus group participants, who had taught an environmental theology course in his church and witnessed an increase in environmental awareness in his church.

CONCLUSIONS

In contrast to most previous studies conducted in western countries, Christians in Hong Kong have a higher willingness to sacrifice for the environment than non-Christians, although the two groups do not differ in their environmental perception or behavior. One reason for the higher environmentalism among Hong Kong Christians against White's (1967) argument or various studies conducted in the United States is that in general Hong Kong Christians hold a higher stewardship instead of a dominion worldview. There is also less divergence in attitude about environmental issues such as climate change in Hong Kong. Such worldview, when combined with justice and love, has prompted environmental perception, and willingness to sacrifice for the environment, and eventually transforms into environmental behavior among Hong Kong Christians. This environmentalism can be further strengthened, however, by more proactive engagement of local churches in environmental education and collaboration with green groups to reinforce the teaching of Christians' role as stewards to protect the environment.

CONFLICT OF INTERESTS STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

All data will be available upon request.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Supporting Information